Improving Communication with Families during Procedures with the Use of the EASE Application

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Abstract

Congenital heart disease patients undergoing cardiac catheterizations are in a procedure and away from their families for 3-6 hours on average. The intraprocedural period causes anxiety for the patient's families. Providing updates that are informative and frequent give families reassurance during this stressful time. The current communication process at Rainbow Babies & Children's hospital involves the catheterization lab staff paging the family and waiting for them to call back to give an update. This process can be time consuming for the staff and is inconsistent. A way to improve this communication process is to implement a new communication process with the mobile communication application EASE (Early Access to Surgical Events). This application allows for one way text messaging from the staff to families during the procedure. This Doctor of Nursing Practice (DNP) project involved implementing the EASE application in a Congenital Cardiac Catheterization Lab. Families were surveyed after the implementation of the EASE application and 98% of the families rated the communication process a 10/10 and 100% of the families said their experience with EASE during the procedure demonstrates compassion and caring toward family members by the hospital.

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Section I. Nature of the Problem

1. Introduction to the Problem

Congenital Heart Disease (CHD) encompasses a myriad of cardiac and major vessel deformities and dislocations that develop in vitro. CHD affects 1% of the births (37,445 babies) per year in the United States (CDC, 2018). About 25% of babies with a CHD have a critical CHD. Infants with critical CHDs generally need to undergo a cardiac catheterization procedure within the first year of life (CDC, 2018). About 75% of babies born with a critical CHD are expected to survive to one year of age. About 69% of babies born with critical CHDs are expected to survive to 18 years of age (CDC, 2018). Therefore the adult population of CHD is growing nationwide. At University Hospitals-Rainbow Babies and Children's (UH-RBC), the adult CHD population makes up 40% of the cardiac catheterization cases.

Patients with congenital heart disease and their families are already stressed in their daily lives of dealing with the disease and disease process (Hodge, Joy, Cox, Naguib, Dmitri et al, 2018). The stress of a procedure on patients and families adds to their burden. The uncertainty from lack of information and communication during the long wait times of complicated procedures only makes things worse. Sources of anxiety for families during a procedure come from fear of death, uncertain outcomes, financial concerns, and uncomfortable hospital situations. Improving communication with the catheterization lab staff and family during a procedure produces a desirable source of comfort for the family. Depending on the procedure, a patient could be away from their families for approximately 3-6 hours. The intraprocedural period causes the most anxiety for families (Hodge, Joy, Cox, Naguib, Dmitri et al, 2018). Intraprocedural updates may ease the patient's family's anxiety during this time (Hodge, Joy,

Cox, Naguib, Dmitri et al, 2018).The current communication process at UH-RBC during a catheterization procedure, is to update the families via pager system or cell phone call. The updates usually take place every 1-2 hours depending on the availability of the catheterization nurse to break from their nursing duties during the procedure to update the family. As a front line communicator with families before and after catheterization procedures, this clinical problem arose from complaints about the lack of timely updates to the family during the procedure.

This DNP project will focus on the communication process for family updates during a cardiac catheterization procedure. This project stems from an issue with the ability to update families/caregivers during a cardiac catheterization.

2. Purpose of the Project

The current communication process of the UH-RBC catheterization lab is outdated and there are several road blocks to the communication process happening seamlessly. The first line of communication is a phone call to the families' cell phone. The family is also given a pager as a back-up in case the catheterization nurse is unable to reach the families by cell phone. The cellular network within the hospital varies on signal strength and it is difficult to get a strong cellular signal to make and receive calls. A page is then sent to the pager, and the family needs to find a hospital phone to call the catheterization nurse back. The key players affected by the problem are families/caregivers, catheterization lab RNs, and the patient. The exact number of family members affected by the problem cannot be defined, as each patient's family size differs, however on average the organization performs 10-15 cases monthly, and there are four catheterization lab staff nurses that are currently affected by the problem.

If this communication problem goes untreated it will cause undue stress and anxiety for the families. This negative affect on the family could result in additional stress on the healthcare

team, specifically the nurses interacting with the families. The families may also score the hospital poorly on their patient experience surveys which affects reimbursement from Medicare and Medicaid. Families may leave the hospital system and go to a competitor that is able to offer better "care" and a more seamless communication process. If this happens then the department of cardiology, along with the hospital system will be negatively affected by the issue. The purpose of this project is to improve the communication process during cardiac catheterizations by implementing a mobile communication application (app), which will improve patient and family satisfaction.

Section II. Review of the Literature

1. Clinical Practice Problem Statement

With patient and family satisfaction scores driving hospital ratings and reimbursement from Medicare/Medicaid, it is crucial to improve the communication process with families during the cardiac catheterization procedure.

PICOT

In pediatric patients undergoing catheterization procedures, how does the delivery of updates via a mobile communication application compared to a pager system affect patient and family satisfaction?

P (Patient population): pediatric patients (some adults based on pediatric disease processes)
I (Issue of interest): delivery of intra-procedural updates via a mobile communication application
C (Comparison intervention): use of pager updates
O (Outcome): patient and family satisfaction

2. Evaluation/Summary of the Evidence from the Literature

A literature review was conducted using CINAHL, PubMed, and EBSCO Host databases to find information on communication during procedures for publication years 2008-2020. These research years were chosen in order to have the most current and up to date knowledge on the topic. An internet search was also completed to locate additional information from google scholar, government resources and children's hospital websites. Search terms included provider communication during procedures, mobile communication applications in health care, provider communication with patients and/or families, updates during catheterization procedures, intraprocedural communication, and pediatric catheterization procedures. See appendix A for the evaluation table of the external evidence.

The use of medical applications (apps) for smart phones is a burgeoning topic of interest. In a mobile device's app store there is a plethora of free and subscription applications that can be used to access information on drugs and drug interactions, offer opportunities for surgeons to support preoperative, intraoperative and postoperative care perform medical calculations, determine prognosis and undertake professional development (Warnock, 2012). Medical smartphone apps are increasingly being adopted into health care for patient education, operative planning, and perioperative care. Furthermore, mobile health technologies are cost effective, can cross cultural and language barriers, and can provide health information and services to low health access areas (Hamilton, et al., 2017).

In satisfaction surveys at an urban, tertiary-care children's hospital administered in October 2014, patient families expressed dissatisfaction with communication during prolonged surgical procedures (Hodge, et al. 2015). Parents were approached with 2 options for communication updates: phone updates to the waiting room that would be approximately every 2

hours, or the digital updates via the application approximately every 2 hours. Nearly 75% of families reported a preference for digital over phone updates during surgery (Hodge, et al. 2015).

Waiting during a surgical procedure on a loved one can be a difficult task. Historically, the operating room has been a black box where patients were taken to be operated on and little communication was provided to the outside world (Jargon, 2019). Offering families, a peek inside the operating room by using a mobile communication app such as EASE (Early Access to Surgical Events) is part of a broader effort on the part of hospitals to provide more transparency to patients' families. Still, such apps are only available in a tiny fraction of the nation's hospitals. (Jargon, 2019).

The literature of focus was specific articles on the EASE application and mobile communication updates. According to de La Rosa and Munro (2017), the use of a mobile application to communicate in real-time from the operating room enhances the family experience and improves satisfaction. Communication is a vital component of the health care experience, and the surgical operating room has often lagged behind other areas in keeping families informed. The utilization of real time text and visual updates with mobile technology is an efficient and effective tool that has been embraced by physicians, nurses, patients, and their families (de La Rosa and Munro, 2017). Providing enhanced communication has been shown to improve the patient experience and increase satisfaction scores and other valuable metrics (Jargon, 2019).

Electronic Access to Surgical Events (EASE) Mobile Device Application

The EASE App is a medical communication app that allows health care providers to update patients and families with secure text, photo, and video updates in real time. The messages or updates are Health Insurance Portability and Privacy Act (HIPPA) compliant, and

they disappear (on the family/patient side) after they are viewed (EASE, 2017). HIPPA compliant messages protect the patient's privacy and ensure the patient's health information is protected according to the HIPPA privacy act of 1996 (CDC, 2019). The EASE updates last 60 seconds before they disappear. The updates are deleted and they are not saved on any mobile device. The EASE App uses 4G, LTE or WiFi connections. Within the app, patients are able to add the family and friends they want to keep informed throughout their medical procedure. Texts, photos and videos are sent at the direction of the patient's medical team. Patients may select preference of update content - receive just texts, texts and photos or texts, photos and videos. The EASE server deletes all messages sent on the servers on a nightly basis. The family, patient, or hospital staff are unable to save any of texts, photos or videos sent during a procedure (EASE, 2017). Families cannot respond with text to the messages, but they may send an emoji such as a thumbs up or a heart in response to staff messages.

In order to simplify the messaging process, EASE has pre-made messages available for staff members to use. Messages such as "The procedure has started", "He/She is asleep with anesthesia", and "The procedure is going well". These premade messages are also available in several different languages. The language available are Arabic, Chinese, Creole, Hindi, Japanese, Portuguese, Russian and Spanish (EASE, 2017). The pre-made messages in specific languages specified above allows staff members to communicate with family members without having to use a separate interpreter. If the language is not available on the application, an interpreter will need to be used. This is not an available feature of the application and will need to be provided by the hospital or facility. Another unique feature of the EASE Application is you can add additional recipients to receive updates on the surgery. During the registration process the family member may simply select them from their contacts and a pre-made text invitation is sent

to them with instructions to join in the updates (EASE, 2017). This is a convenient feature for family members/friends who cannot be at the hospital but still want to be informed of the patient's outcomes. This has really become an important factor during the visitor restrictions of the COVID-19 pandemic. University Hospitals' visitor policy changes frequently based on the COVID-19 positivity rate in the community, sometimes only allowing one visitor per patient. The EASE app would allow the other family members to remain informed during the patient's procedure without actually being at the hospital.

Additional cyber safety and security provided by the EASE app include end-to-end encryption, all messages are sent using AES 256-bit encryption. End-to-end encryption scrambles messages in such a way that they can be deciphered only by the sender and the intended recipient. End-to-end encryption takes place on either end of a communication. A message is encrypted on a sender's device, sent to the recipient's device in an unreadable format, and then decoded for the recipient (Perlroth, 2019). End-to-end encryption ensures that no one can hack into the contents of a message while it is in transit. Encryption is a powerful tool used for privacy in the technology field and is used by media messaging companies such as Facebook and Instagram (Perlroth, 2019). EASE uses Amazon Web Services (AWS) cloud platform which allows it to compute, store, analyze, and secure their data. All data on the cloud is secure and AWS is used by leading Fortune 500 companies and the US Government (Amazon Web Services, 2019). EASE is consistently tested using vulnerability scans and penetration tests to prevent data theft or corruption. (EASE, 2017).

In regards to customer service, the EASE customer support service handles all support calls from patients, families, and the hospital team. Hospital team members can reach out to their hospital Information Technology (IT) department as well, but if the issue is regarding the devices

or connectivity often times the EASE customer support team can trouble shoot the errors. The support team is available by phone, chat, and frequently asked questions (FAQ) section of the website. This service is included in the overall cost of the app and will not charge users any fees (EASE, 2017).

In 2012, clinicians at Orlando Health Arnold Palmer Hospital for Children developed the mobile application to provide real-time updates of surgical procedures to families in the waiting room (EASE, 2017). It quickly became a family favorite. As usage of EASE approached 15% to 20% of the daily OR cases, families began to request the program after hearing about it through internal hospital marketing, from nursing staff or surgeons, or word of mouth from other families. Adoption increased rapidly to include all of the surgical subspecialties (de la Rosa and Munro, 2017).

At another children's hospital where EASE was being implemented. One of the physicians suggested that nurses examine the rate of compliance for providing updates to families during surgeries before the EASE test and during it, and to measure families' satisfaction (Hodge, et al. 2015). The nurses found that they provided families with more frequent updates after EASE was implemented and that the percentage of families that rated their experience during surgery as "very good" rose to 97% following the EASE pilot, up from 80% before (Hodge, et al. 2015). The results convinced the hospital to offer EASE to the families of every patient in its heart center as well as every child who is having a catheterization and all children undergoing general surgery (Hodge, et al. 2015).

The EASE Application marketing team released data that out of 20,000 families surveyed 98% strongly agreed, based on experience with EASE they would recommend the hospital to others. Ninety-nine percent of those surveyed strongly agreed that EASE reduced their anxiety.

Ninety-three percent said yes, the availability of EASE would influence their choice of a hospital (de la Rosa and Munro, 2017). In addition the EASE marketing team surveyed nurses at hospitals where the application is in use. The nurses surveyed agreed that EASE is not disruptive to their work flow, it enhances efficiency, is valuable to the family and is more reliable than a phone call (de la Rosa and Munro, 2017).

3. Critical Appraisal of the Evidence

A synthesis of the literature was done for this DNP project. The synthesis included randomized controlled trials, cross-sectional surveys, meta-analyses, mixed methods, and literature reviews. A majority of the research articles focused on the use of mobile applications in the medical field. Special emphasis was placed on the articles that dealt specifically with the use of mobile communication applications between medical staff and patients/families. The evidence overwhelming leaned towards the growing use of mobile applications in the medical field (Leavy, 2019). Evidence surrounding the use of mobile communication applications particularly in the intraprocedural areas was in its infancy. However the majority of the current research findings is in appraisal for the use of mobile communication applications during procedures or any portion of the hospital stay. Gaps in the literature include availability of articles specifically targeting communication applications for medical/surgical purposes. The recent development of most of the technology to communicate via mobile applications with patients and families, led to limited resources on the subject. The synthesis table is available as appendix B.

4. Presentation of theoretical basis

Iowa Model of Evidence Based Practice to Promote Quality Care (Appendix c)

The identified evidence-based practice model for implementation will be the Iowa Model of Evidenced Based Practice to Promote Quality Care (Iowa Model). This model provides guidance for clinicians in making decisions about clinical practices that affect patient outcomes

(Melynk & Fineout-Overhalt, 2018). The Iowa Model was selected because it is intuitively understandable and it is a well-known and used model in academic medical centers. In addition, the Iowa Model was chosen for this project due to its step by step process, which will help the DNP student and staff to incorporate this evidence into a feasible practice change (Titler & Adams, 2010). The Iowa Model has ten steps to its evidence-based process. The steps include:

1. Select a priority topic based on triggers
2. Form a team
3. Assemble evidence
4. Critique and synthesize evidence
5. Set forth the evidence-based practice recommendation
6. Decide if findings support a practice change
7. Determine if the change is appropriate for adoption in practice
8. Monitor structure, processes and outcomes
9. Disseminate findings (Melynk & Fineout-Overhalt, 2018).

In using the Iowa Model for this DNP project, the problem focused trigger would be communication during procedures and process improvement. The team would consist of the catheterization lab staff RNs, physicians, cardiology fellows, cardiology IT team member, and a quality team member. Evidence will be gathered on the current communication process during procedures. This evidence will then be analyzed and the findings will be reported. The new evidence-based practice change of using a communication mobile application will be piloted. The new practice change will be surveyed and the results reviewed. This new data will then be reviewed with the catheterization team and the quality team will decide if this new evidence based practice will continued to be used at the institution. The Iowa Model will be very helpful

as a guide throughout this DNP project. It provides several feedback loops which are critical to individualizing the evidence for the practice setting and promoting adoption throughout the hospital system (Melynk & Fineout-Overhalt, 2018).

Diffusion of Innovation Theory (Appendix C)

The Diffusion of Innovation Theory (DOI) was chosen to answer the

"how" for the improvement of communication. According to Rogers (2003), inventions change the behaviors of people: "Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 12). The DOI theory for the EASE application might be applied on the communication level--where hospital staff diffuse the technology to patients via the mobile updates.

The DOI theory is sometimes described with five key elements. According to Rogers (2003), the five elements are the attributes of the innovation, the type of decision, the communication channels, the social systems, and the change agent. According to DOI theory, the change occurs due to reasons for expansion of the innovation and the importance of the innovation to the social system. The DOI theory provided a framework for understanding the adoption of EASE application in the procedural setting and the caregiver satisfaction as a change agent to promote adoption (Rogers, 2003).

Historically, the DOI theory has been applied to evolution of high-technology devices from computers to portable tablets (Sena & Sena, 2013). In the early days, the personal computer was a device only for a select group of technically inclined individuals. Sena and Sena (2013) showed the tablet evolved from the personal computer and tablets took on many forms still in use today. As applications became more effective, the computer and its derivatives, the tablet and the

smartphone, became the dominant form of communication for the masses and are now at the heart of nearly all communication channels.

The expected number of procedural and surgical service lines adopting an innovation as of function of time, i.e. the rate of adoption, follows a Bell curve--beginning with a small number of adopters, growing to a peak, and then declining again. This curve, shown in Appendix D, is one of the basic tenets of DOI theory. The only adopters in the very early stages of the lifecycle of the mobile communication application are the few clinical innovators who find a need and learn how to use it. The second likely group of adopters will be clinical providers who are aware of the benefit of mobile updates and are willing to climb a learning curve to access this technology. The early majority has the advantage of learning from the early adopters and innovators and the late adopters are people who adopt the EASE application only after the program has widespread acceptance. The final service line is the laggards who are often coerced into a technology that has become the norm and not using it has left them at a disadvantage.

5. Recommendations Summary

The focus of this quality improvement project is to improve communication with families during catheterization procedures with the use of a mobile communication app. In today's modern age, technology is at our figure tips, literally on our phones and communication devices. Providing timely communication is quick with text messaging. With patient and family satisfaction at the forefront of healthcare, taking the initiative to improve communication with the use of a mobile app appears to be an instant way to improve patient and family satisfaction. The stakeholders in this quality improvement project include all members of the cardiac cath lab staff (Nurses, Radiation Technologists, Care Coordinators, and Nurse Practitioners), the pediatric cardiologists and fellows, Cardiology IT team member, this DNP student, as well as the patients and families that are undergoing the procedure and receiving updates. Engagement of the

stakeholder will be approached by reviewing patient/family satisfaction scores, discussing the current communication method, and watching an informative video on the EASE app. Presentation of the EASE application and these engagement activities will be done at a quality meeting with the staff and stakeholders. Successful adoption and implementation of electronic communication requires a cultural change within an organization. Adoption and implementation of innovations in health care can follow a phased process that identifies innovators to test the process and then allows expansion to occur organically (de La Rosa & Munro, 2017). The first major barrier to this project is the cost. The implementation and training from the EASE partners is $6,000, the annual licensing fee is $16,000, and approximately $800-1000 for the purchase of four iPods. The second barrier is the UH IT department screening process. The UH IT department has to clear and verify all new electronic applications and this process can be time consuming. Clearance from UH IT involves review of the application by the department, review of applications impacts on the UH system and utilization of technicians. After meeting with the IT team member, the estimated time for clearance is 6-8 weeks. The cost barrier is possible to overcome with the Heart Center Director factoring the application in the 2020 planned budget. Additional barriers to this project include training of staff, additional time for training of staff, and families having smart phones. According to Pew Research, 81% of Americans have a smart phone, so this barrier is not as significant. However, some families may not have the data plans or storage space to download an additional application on their phone (Pew Research, 2020). A training guide will need to be made and timeline for training created. This will then need to be discussed with and cleared by the manager of the catheterization lab. A portion of the iPods purchased for this project will be for family use during cases.

Section III. Methods

1. *Recommendations for Implementation of Practice Change*

The proposed solution to this problem is to implement a new way of communicating with the families during a cardiac catheterization procedure. The new form of communication will be via a medical communication app called EASE. The families can either download the app to their mobile device or a hospital mobile device can be provided for them to use during the procedure. The application can run on either wifi or cellular reception (EASE, 2017). This app allows the provider or staff to send custom or preset family updates through texts, photos and videos. The implementation of the EASE app would enhance timely communication, eliminate missed phone calls, poor cellular reception, as well as use of archaic paging technology. The simplicity of sending text updates instead of phone calls will help the staff be more efficient with their time. This communication change could then improve patient and family satisfaction during catheterization procedures (EASE, 2017).

2. *Implementation of Practice Change*

This quality improvement project will be focused on the improvement of communication with families/caregivers during congenital cardiac catheterizations. The practice change to improve communication will be with the implementation of the patient communication application EASE. This practice change will take place over a 6-12 month time period. The implementation of the EASE application will be bookended by a pre-EASE communication survey and a post-EASE communication to survey.

3. *Sample and Setting*

This project will take place at UH-RBC in Cleveland, Ohio. The hospital is classified as a tertiary hospital, Level 1 Pediatric Trauma Center and an academic medical center. UH-RBC is part of The Congenital Heart Collaborative with Nationwide Children's in Columbus, Ohio. The patient population for this project will be pediatric and adult congenital heart disease patients, specifically those patients undergoing congenital cardiac catheterization procedures. The size of the population varies with approximately 130-150 cardiac catheterization procedures performed per year at UH-RBC. The setting will be pre and post-catheterization procedure with the main focus being on communication in this setting. The subjects of the sample will be the family and caregivers of the congenital heart disease patients. The population of patients will be congenital heart disease (CHD) patients. This will encompass both pediatric and adult patients who are followed and managed by pediatric cardiology. Adult patients continue to follow with pediatric cardiology due to the congenital nature of the disease. Advances in diagnosis and treatment have allowed children with congenital heart disease to survive well into adulthood (Mayo Clinic, 2020).

4. *Readiness for Change*

The communication process at UH-RBC is affecting patients, patient care and staff. The catheterization lab leadership is ready for a change in the process and has been presented the option of this DNP project. The catheterization lab lead physician was very enthusiastic about the EASE app and the upgrade to the communication process, and the lead physician has approved the purchase of the EASE Application. As previously discussed, the major barriers to this project are cost of implementing this application and the IT department's availability to make necessary changes.

5. *Ethical Concerns*

The ethical issues surrounding the project topic are focused on the patient's privacy and protected health information (PHI). Currently, the Health Insurance Portability and Accounting Act (HIPAA) contains the primary set of regulations that guide the privacy and security of health information. HIPAA requires that identifiable health information be encrypted so that only those authorized to read it, are granted access (Hall, McGraw 2014). In order to protect patient privacy and PHI, the EASE app uses end to end encryption. End to end encryption is a method of secure communication that prevents third-parties from accessing data while it's transferred from one end system or device to another. After a family receives a message, the text/picture/video is deleted within 60 seconds of viewing it. All messages are deleted from EASE's server each night as well. To prevent hacking of the EASE's data, they consistently test the system using vulnerability scans and penetration tests (EASE, 2017).

6. *Measurement Methods*

This quality improvement DNP project will utilize surveys as an instrument of measurement. In order to assess the current communication process being used during cardiac catheterization procedures, a survey will be conducted. This survey is called the pre-EASE survey. It was given to families/caregivers after the procedure and in order to review the current communication process. The survey is five questions. The survey questions are available in Appendix E. After the implementation of the EASE application, a second set of surveys was completed assessing the new communication process. The five questions are relatively the same with statement current communication process replaced with EASE Application. A copy of the survey questions is available in Appendix F. This style of project benefits from a feedback style measurement tool because it is about improving patient satisfaction. It is sometimes hard to

measure the feeling of satisfaction. Both surveys were developed specifically for this project and is not a validated survey from the literature on the EASE application. The goal is that the survey results on communication will improve after the implementation of the EASE application. The goal of this project was to improve the communication process with the implementation of the EASE application. The main determining question of the survey is number 5, which has the family member rate the current communication process and the Ease application communication process on a scale of 1-10 (1 being the lowest and 10 being the highest). This question will be the main priority for determining improvement in communication.

7. Data Collection

Data from the pre-EASE surveys was collected via paper surveys and through SurveyMonkey from April 1, 2020 through June 30, 2020. SurveyMonkey is one of the most popular survey products listed in the text by Sylvia & Terrar. The use of online survey tools like SurveyMonkey offer fast and flexible means to gather, measure and analyze data. The paper survey data was imputed into the SurveyMonkey site in order to have an automated total for surveys (SurveyMonkey, 2018). A total of 27 surveys were completed. The post-EASE surveys were generated by the application itself from July 1, 2020 through October 31, 2020. This set was all done automatically and the results populate automatically on the EASE Application website. A total of 46 post-EASE surveys were completed.

In regards to privacy, all of the surveys for families/caregivers were anonymous. The surveys were handed to the individuals following the patient's procedure. This DNP student tried to follow up with most of the families before their discharge, but due to timing of discharge and availability of family members a few surveys were not completed. However, some families may have chosen not to fill them out or they left the hospital before the DNP student had checked

back in with them regarding it. A barrier to the pre-EASE survey collection was the smaller volume of cases and access to patient's family members due to restrictions of the COVID-19 pandemic. Many elective cases were cancelled by the hospital and the amount of interaction with family members by auxiliary team members such as this DNP student was limited. This resulted in a smaller number of survey results.

Section IV. Evaluation

1. Data Analysis

The goal of this project was to have the ratings on this question improve from pre-EASE to post-EASE. The analysis of data was done by the DNP student. The complete data from the pre-EASE surveys is available appendix E. The use of Microsoft excel spreadsheets was used to analyze survey data not provided by SurveyMonkey. The highest priority question asks "Rate your overall experience with the current communication process (1 very dissatisfied-10 very satisfied)". The pre-EASE survey data showed 28% of the family members rated the current communication process at an 8/10, 19% at 7/10, 19% at 6/10 and 18% at 5/10. The results of this question were low and showed that family members were not happy with the current communication process. The goal of this question would be to improve to have the most survey results at 10/10 on the post-EASE survey. Question 2 "Based on my experience with the current communication process, I would recommend this hospital to others?" resulted in 22% of the family members strongly agreed with the question, 52% were neutral, and 26% strongly disagreed with the question. The results of this question demonstrated that the communication process was affecting the way the family viewed the hospital and that it would affect future recommendation of the hospital to others.

The complete data from the post-EASE surveys is available in Appendix F. The post-EASE survey results were positive towards the application and the communication process. All

of the survey results showed improvement after the implementation of the EASE Application. On the post-EASE survey question 5 improved greatly with 98% of the family members rating the EASE communication process a 10/10 and 2% rating it a 9/10. Question 2 also improved to 98% of the family members recommending this hospital to others. The results of this question help to show that the EASE application is proving its return on investment.

Section V. Recommendations

1. *Identify Methods for Dissemination*

The two methods of dissemination include: 1. Presentation of the data findings and results to The Congenital Heart Collaborative (TCHC) Quality Committee and 2. Presentation of the data findings and results to the UH-RBC Executive Quality and Safety board.

The TCHC Quality Committee meets biannually and a presentation was made during their fall 2020 meeting. The EASE Application was described in detail, and a demonstration was provided. The results of the pre and post-EASE survey were also presented. The TCHC Quality Committee was impressed with the modern update for communicating with families and the simplicity of the communication method. In addition with the visitation constraints posed by the COVID-19 pandemic, the ability to update families who are unable to be at the hospital is a necessity. Based upon the feedback, the EASE application is going to be expanded to the Pediatric Cardiac Stepdown Unit (CSDU) and the Cardiothoracic Intensive Care Unit (CTICU).

The UH-RBC Executive Quality and Safety board presentation would be addressing the entirety of the pediatric quality department in order to expand the use of EASE to the areas of pediatric surgery and pediatric surgical subspecialties. However due to the hospital's current financial situation as a result of the COVID-19 pandemic, the probability of the hospital taking on additional expenses at this time is not likely. After the implementation of the EASE Application into the rest of The Heart Center, future data could be produced to show a larger

number of positive survey results and patient satisfaction. The cardiac catheterization lab patients do not meet the criteria for the hospital's Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey because they do not meet inpatient stay criteria. HCAHPS is a national, standardized, publicly reported survey of patients' perspectives of hospital care (CMS.gov, 2021). Patients admitted to the CTICU or CSDU will be able to participate in the HCAHPS survey and if there is an improvement in the scores after the implementation of the EASE application, this data could be taken back to the hospital administration in order to expand EASE into other departments.

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Appendix A: Evaluation Table

Author (Year)	**Conceptual Framework**	**Design/Method**	**Sample/ Setting**	**Major Variable**	**Measurement**	**Data Analysis**	**Findings**	**Appraisal**
Hodge, A. et al. Pediatric Quality and Safety, 2, 1-7 (2018)	None	24 Month QI Study	CT Surgery patients. 57% male, median age 8.2 years	Access to mobile device, total surgery time	Comparison of compliance data collected pre-EASE and post-EASE application	Increase in compliance rate from 46% to 97%	Key finding of improvement in patient satisfaction after implementation of the application	Use of EASE improves patient satisfaction scores
Daniel, F. et al. JMIR, 6, 1-7, 2017	None	Cross-sectional observational study	238 Physicians	Standpoint (with/against/neutral)	Online questionnaire	Majority of participants were concerned with the breach of privacy with mobile apps	Email and WhatsApp communication was preferred	Concern for patient privacy and HIPPA with use of mobile applications
de la Roza, K. et al. 2017	Diffusion of Innovation Theory	12 month QI study	Patient families	type of messages (text vs picture vs combination	Survey after use of app	Analysis of 3000 responses	Improvement in family anxiety, improvement in satisfaction scores	Use of EASE improves patient satisfaction scores

Gordon C. et al 2015	None	Prospective multicenter study	Patients of elective surgeries and their families	Delivery of messages via text, email or phone	online feedback survey	Analysis of 803 surveys- 94% would sign up for mobile messaging	Improvement in communication during the intraoperative period	Families felt more connected to their loved ones during the procedure
Hamilton, E. 2019	None	QI	family members of patients	Severity of procedures and length	Survey after use of app	Review of 60 hospitals satisfaction scores	Improvement in communication during the intraoperative period	Family members prefer text message updates
Hamiton, E. et al. 2017	None	Descriptive study	Patients	No comparison group, Socioeconomic group	Survey	92% of respondents use mobile health applications	76% of the respondents would like to use a mobile health application in regards to their child's health	52% of the group would like to use mobile message apps during hospital stay
Jargon, J. 2019	None	Technology	Review of families and patients	None	Survey results	90% reduction in waiting room anxiety	Improvement in family anxiety	Use of EASE application reduced family anxiety during procedures
Jenssen, B. et al. 2015	None	Qualitative	3336 panel members	ethic group, education level	Survey	Participants would rather participate via	Despite regular use of technology,	Participants prefer email over mobile

						phone or email vs. text regarding their health	few participants would like to communicate with medical team via text	text messaging
Munday J. et al. 2013	None	Systematic Review	Nursing staff	level of care provided by the family	Review of studies	Reduction in family anxiety with more communication from providers	In person communication was preferred	When in person communication was not available families preferred mobile updates over phone calls
Nikolic A. 2018	None	Quantitative and Qualitative Study	Medical Staff-118 participants	Physicians, Residents, Medical students	Survey	Analysis of 118 survey results broken down into communication app use and perception of safety and privacy	67% thought communicating patient information through an app was safe	Confusion exists over whether patient consent is required for sharing patient information. EASE app has consent form.
Topp R. et al. 1998	Stress and Coping Theory	Qualitative and Quantitative Analysis	1st study 28 subjects, 2nd	Pager vs in person communication	6 item questionnaire	Data analyzed in 3 phases	Providing pagers had little impact on family	Families preferred frequent updates, but

			study 29 subjects				anxiety during procedures	it did not relieve their anxiety.
Vermeir, P. et al. 2015	None	Narrative Lit Review	69 articles	Publication dates between 1985-2014	Narrative Lit Review	Analysis of 69 articles	Room for improvement in both content and timeliness of communication in healthcare	Healthcare communication needs to be improved. Mobile communication apps might be the answer to the issue.
Warnock, G. 2012	None	Narrative Lit Review	App review, no participants	Style of applications	Review of applications	Use of apps during surgical procedures	Benefits to patients and to the proceduralists of communication during procedures	Benefits to patients and to the proceduralists of communication during procedures

Appendix B: Synthesis Table

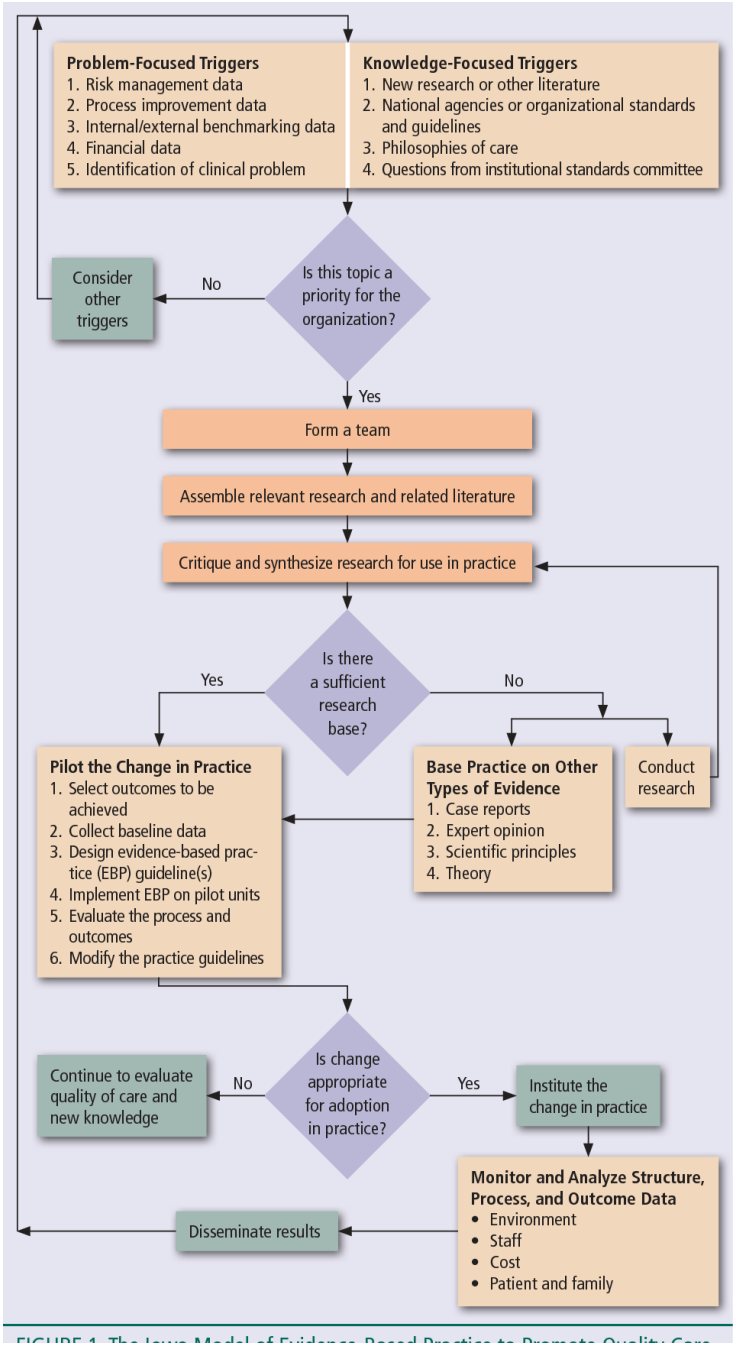
Study/ Author	**Year**	**# Participants**	**Mean age or other sample characteristic pertinent to your question**	**Study Design**	**Intervention**	**Major finding that addressed your question**

Hodge, A. et al. Pediatric Quality and Safety, 2, 1-7	2018	431 Patients	57% male, median age 8.2 years	QI	Implementation of communication application during cardiac surgery	Key finding of improvement in patient satisfaction after implementation of the application
Daniel, F. et al. JMIR, 6, 1-7	2017	238 physicians	Attending physicians, medical specialties	Cross-sectional observation study	Views of physicians regarding use of mobile apps to communicate with patients	A majority of the physicians were reluctant to use web based apps to communicate with patients
de la Roza, K. et al. NEJM	2017	50 patient families	Patient families	QI	Reduce waiting room anxiety	98% reduction in waiting room anxiety by use of the EASE app.
Gordon C. et al Patient Safety in Surgery, 9, 21	2015	313 patients	Patients, family of patients	Prospective Multicenter Study	Enroll patients in web based service for perioperative updates	Improvement in the communication process between surgeons and families in the intraoperative period
Hamilton, E. Parent Herald	2019	60 hospitals	Family members of patients	QI	Use of EASE app for family updates	Family members prefer text message updates

Hamilton, E. et al. Journal of Pediatric Surgery	2017	171 caregivers	94% smartphone users QI	Descriptive	Survey on the use of mobile health apps for caregivers	76% of caregivers are willing to use a smartphone app for their child's care
Jargon, J. Wall Street Journal, 1-5	2019	Technology Review	Family members of patients	Narrative literature review	Waiting room anxiety eased with use of communication application	Improvement in family satisfaction with the use of the EASE app
Jenssen, B. et al. JGIM, 31, 85-92	2015	3336 panel members	100% adult panel members	Qualitative	Survey on the use of health care applications	64% of the panel members were willing to communicate via text message
Munday J. et al. Joanna Briggs Institute Database, 11, 283-298	2013	Information sharing strategies	Nursing Staff	QI	Review on the best available evidence to information share with families	Effectiveness of EBP interventions designed to reduce the anxiety of families waiting during a surgical procedure
Nikolic A. et al. JMIR, 6	2018	118 participants	Medical staff	Survey Study	Popularity of apps for medical communication	Majority of medical staff used communication apps on a daily basis and were comfortable with the concept

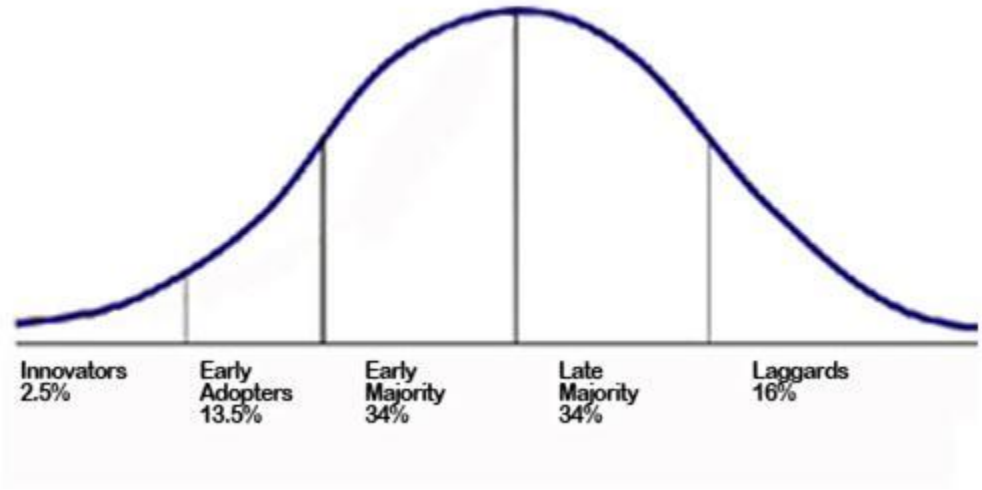
Topp R. et al. AORN, 67, 852-860	1998	1st study 28 subjects, 2nd study 29 subjects	48 years old	Qualitative and Quantitative Analysis	Study on reducing anxiety while waiting for a family member with the use of pagers	Study on the use of pagers during procedures which is what the RBC system uses currently.
Vermeir, P. et al. International Journal of Clinical Practice	2015	69 articles	Physicians and Medical Staff	Narrative literature review	Effects of physician's communication with patients based on time	Quality of communication and improving communication channels
Warnock, G. Can J Surg, 55, 77	2012	App Review, no participants	Medical staff	Narrative literature review	Use of apps during surgical procedures	Benefits to patients and to the proceduralists of communication during procedures

Appendix C: Iowa Model



(Melynk & Fineout-Overhalt, 2018)

Appendix D: Diffusion of Innovation Theory Model



(Rogers, 2003)

Appendix E: Pre-EASE Application

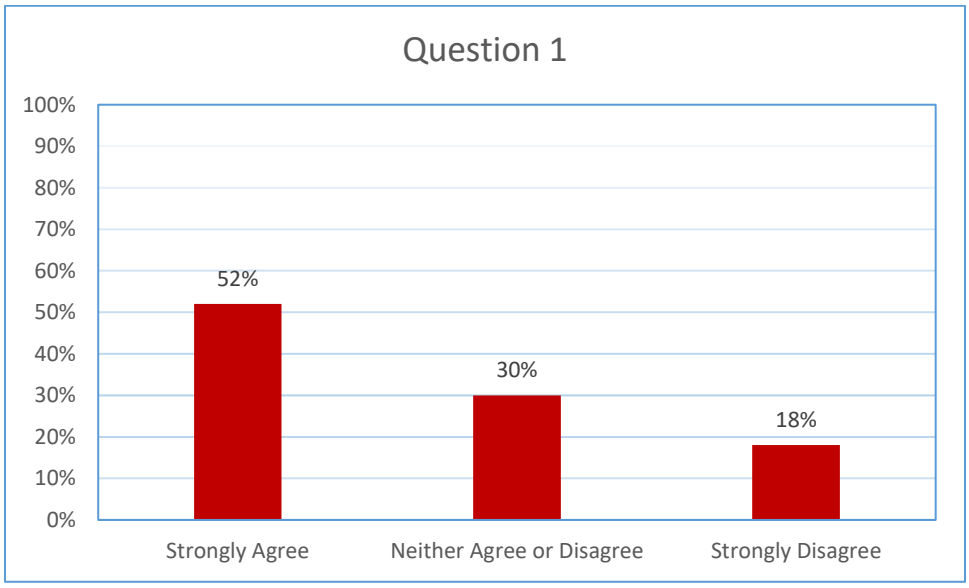
Pre-EASE Survey Questions:

1. My experience with the current communication process during this procedure demonstrates compassion and caring toward family members by the hospital.
   –Strongly Agree/Yes --Neutral --Strongly Disagree
2. Based on my experience with the current communication process, I would recommend this hospital to others?
   –Strongly Agree/Yes --Neutral --Strongly Disagree
3. My experience with current communication showed a level of commitment to transparency and better communication by this hospital.
   –Strongly Agree/Yes --Neutral --Strongly Disagree
4. Would the availability of a new communication application influence your choice of hospital, should you or a loved one require surgery? –Strongly Agree/Yes --Neutral --Strongly Disagree
5. Rate your overall experience with the current communication process (10 very satisfied-1 very dissatisfied):

Pre-EASE Survey Data

Table 1

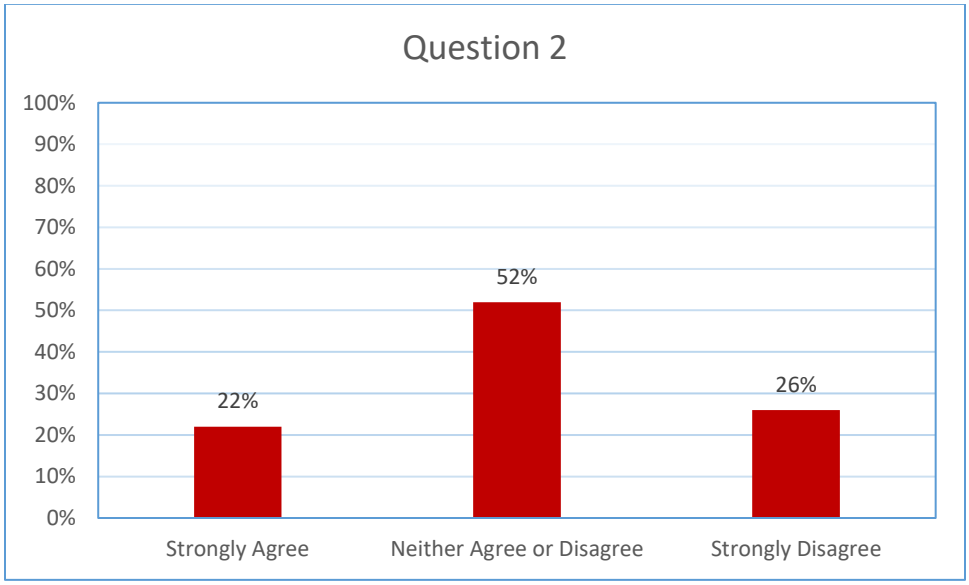
Question 1: My experience with the current communication process during this procedure demonstrates compassion and caring toward family members by the hospital



Note. N = 27.

Table 2

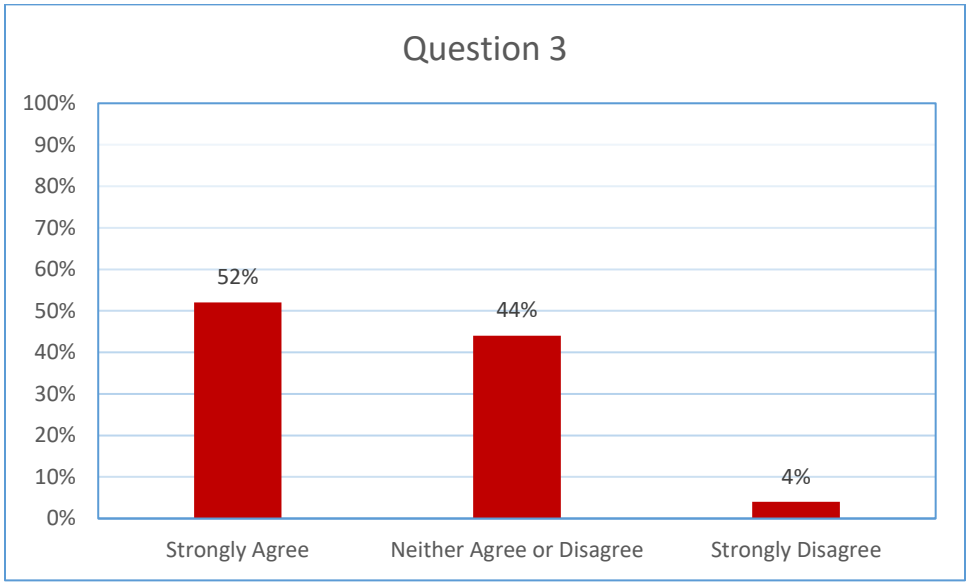
Question 2: Based on my experience with the current communication process, I would recommend this hospital to others?



Note. N = 27.

Table 3

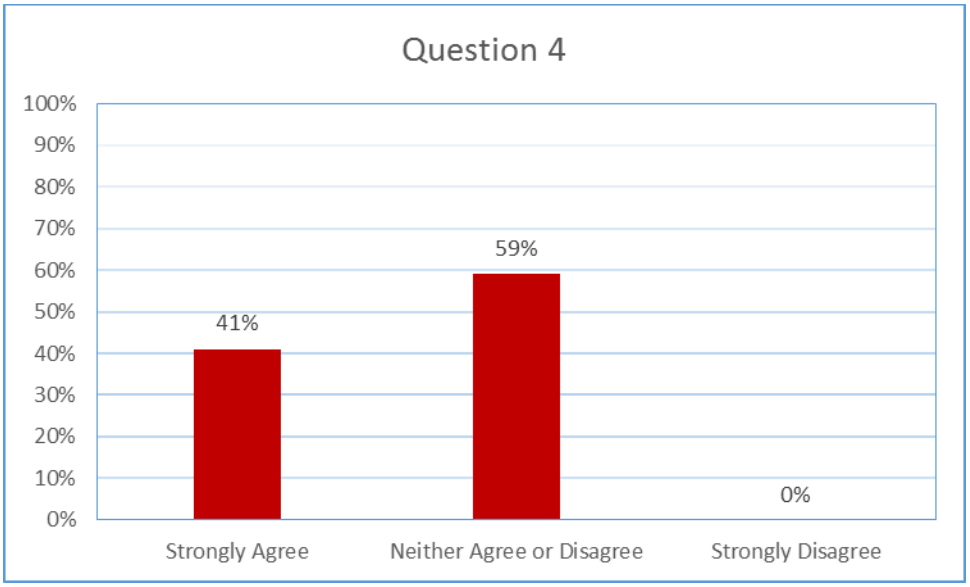
Question 3: My experience with the current communication process showed a level of commitment to transparency and better communication by this hospital



Note. N = 27.

Table 4

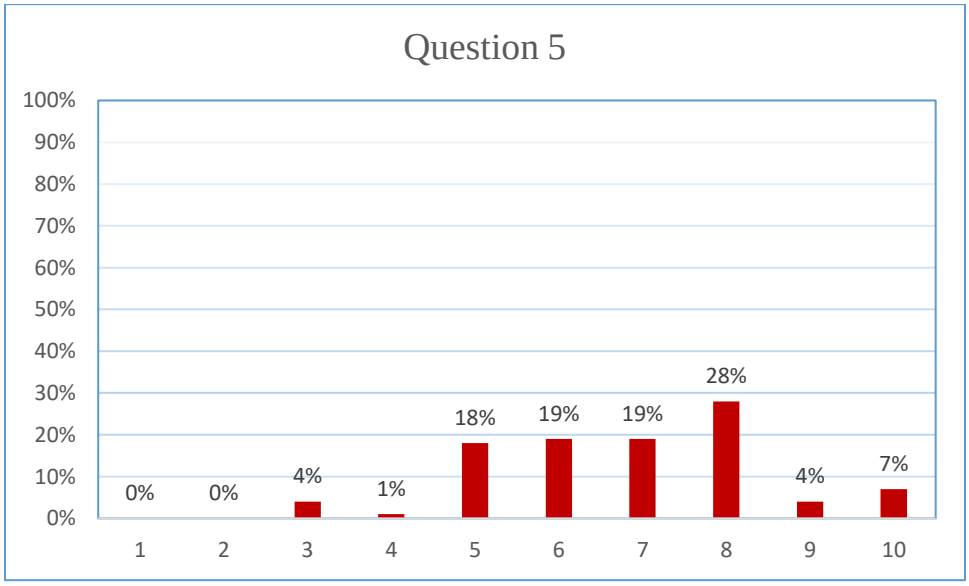
Question 4: Would the availability of a new communication application influence your choice of hospital should you or a loved one, require a procedure?



Note. N = 27.

Table 5

Question 5: Rate your overall experience with the current communication process (1 very dissatisfied-10 very satisfied):



Note. N = 27.

Appendix F: Post EASE Application

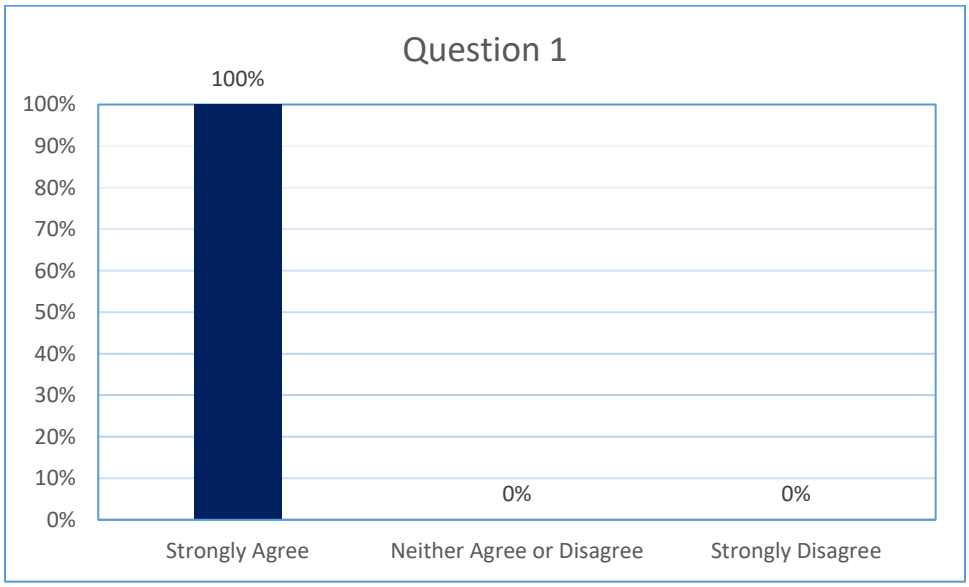
Post-EASE Survey Questions

1. My experience with EASE demonstrates compassion and caring toward family members by the hospital. –Strongly Agree/Yes --Neutral --Strongly Disagree
2. Based on my experience with EASE, I would recommend this hospital to others? –Strongly Agree/Yes --Neutral --Strongly Disagree
3. My experience with EASE showed a level of commitment to transparency and better communication by this hospital.
   –Strongly Agree/Yes --Neutral --Strongly Disagree
4. Would the availability of EASE influence your choice of hospital, should you or a loved one require surgery? –Strongly Agree/Yes --Neutral --Strongly Disagree
5. Rate your overall experience with EASE (10 very satisfied-1 very dissatisfied):

Post-EASE Survey Data

Table 1

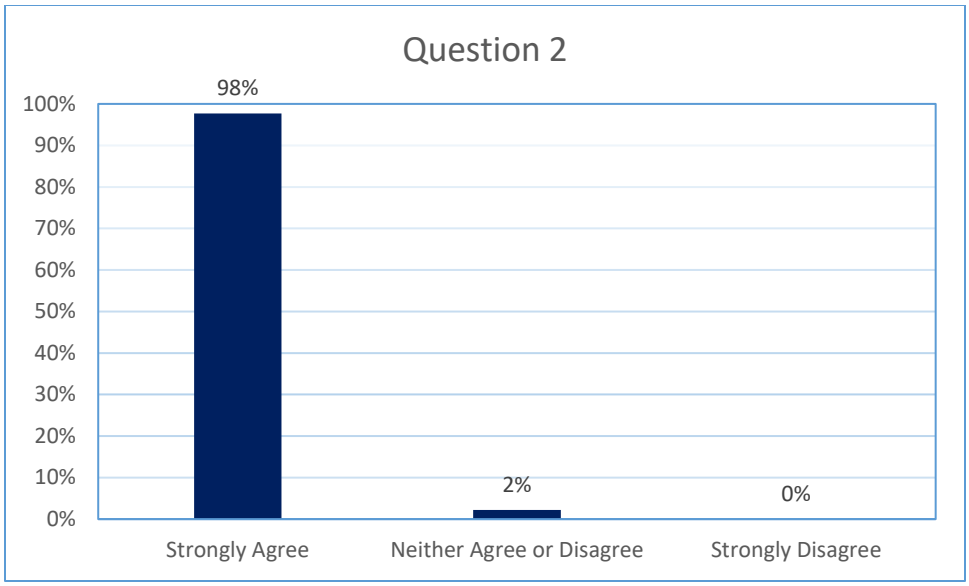
Question 1: My experience with EASE during this procedure demonstrates compassion and caring toward family members by the hospital



Note. N=46

Table 2

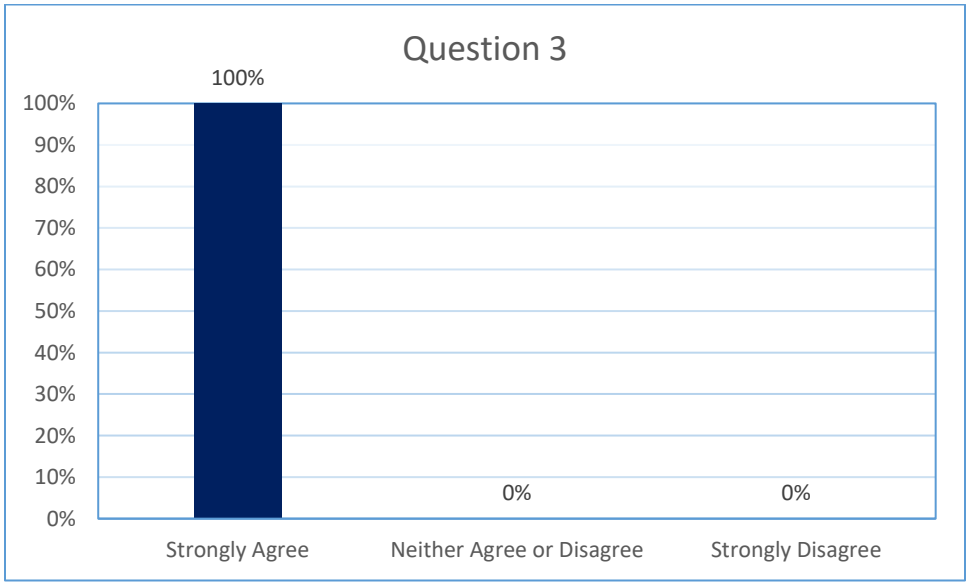
Question 2: Based on my experience with EASE, I would recommend this hospital to others?



Note. N=46

Table 3

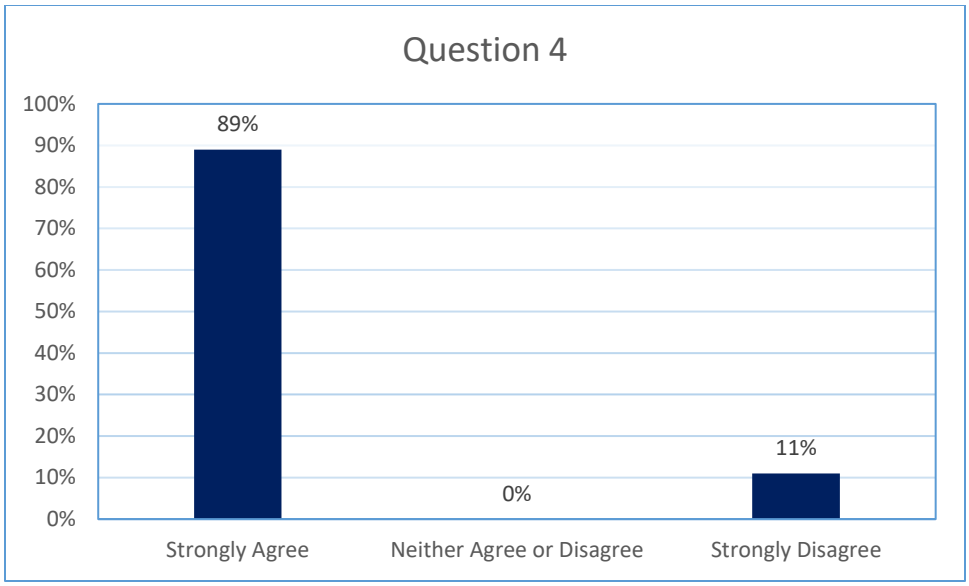
Question 3: My experience with the current communication process showed a level of commitment to transparency and better communication by this hospital



Note. N=46

Table 4

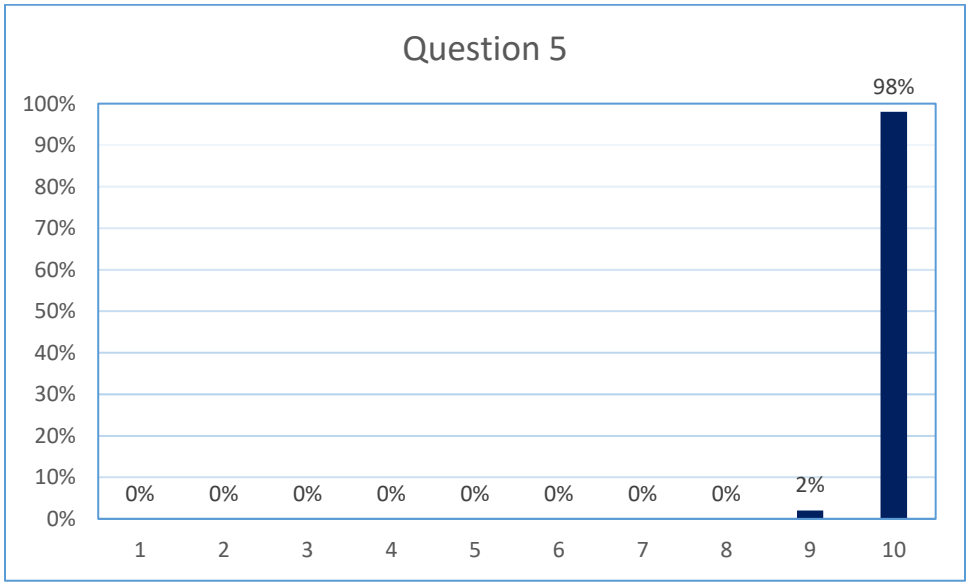
Question 4: Would the availability of a new communication application influence your choice of hospital should you or a loved one, require a procedure?



Note. N=46

Table 5

Question 5: Rate your overall experience with the current communication process (1 very dissatisfied-10 very satisfied):



Appendix G: Human Subjects Form

Human Subject Research Determination Form

Please complete the survey below.

Thank you!

Response was added on 03/27/2020 2:17pm.

Instructions:
1. Please complete the requested project information, as this form may be used for documentation that neither IRB review nor an exemption is required.

2. Please select the appropriate answers to each question in order as they appear. If all of the questions are answered without receiving an error message, the form must be printed AND signed as certification that the project is "not human subjects research," and does not require IRB review or exemption.

If you are unsure how to answer any of the questions, please contact ORRP for additional guidance at ORRPDeterminations@osu.edu.

PROJECT INFORMATION	
Name of PI, advisor, or mentor	Dr. Janna Stephens
Advisor Email	stephens.653@osu.edu
Student Name:	Katherine O'Neill
Project Title	Evidence Based Quality Improvement Project to Improve Communication with Families during Cardiac Catheterization Procedures with the use of the Ease Application
Brief Description of Project/Goals:	-Improve communication with the use of a mobile communication application instead of a phone call or pager -Improve patient and family satisfaction scores (This information is important and provides the necessary information to determine if the project requires IRB review.)

QUESTIONS	
1. Will the project involve testing an experimental drug, device (including medical software or assays), or biologic?	◯ Yes ⊗ No (This question determines if additional federal regulations, like FDA regulations, apply to the project. This information is based on the Common Rule (45 CFR 46.102(d)) that states "Research means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge." If the answer to this question is 'YES' - IRB review is likely required.)

2. Has the project received funding (e.g. federal, industry) to be conducted as a human subjects research study?	○ Yes ⊗ No (This question is to determine if the project received funding to be conducted as a research study, quality improvement, or program evaluation. If the funding source requires a specific level of IRB review and oversight or considers the project to constitute human subjects research, you may be required to submit an IRB application.)
3. In addition to any other purposes, is the project intended to develop or contribute to generalizable knowledge (e.g. testing a hypothesis) AND/OR has the project been designed in such a way that the findings will be generalizable (e.g. randomization of subjects; comparison of case vs. control)?	○ Yes ⊗ No (This question is to evaluate project intent and design. The project design plays a key role in determining intent. If the project uses standardized research methods like testing a hypothesis or randomization to determine results, then it is research. If the intended outcome is simply to report on what happened at the institution/program, even if another site does something similar and sees benefit, this does not indicate research design or intent.)
4. Will the results of the project be published, presented or disseminated outside of the institution conducting it?	⊗ Yes ○ No (The purpose of this question is to determine if and how project results will be disseminated. Note that program evaluation and QI projects can be published or presented without being considered research projects; not all information that is published or presented represents generalizable knowledge. Lack of intent to disseminate the information is generally a strong indicator that a project does not constitute research.)
5. Will the project occur exactly as proposed regardless of whether individuals conducting it may benefit professionally from it?	⊗ Yes ○ No (This question is not focusing solely on whether an individual will professionally benefit, but rather whether they would conduct the project (or conduct it in the exact same way) regardless of the potential for professional benefit (e.g. adding it to a CV or getting funding based on the results).)
6. Is the project intended to improve or evaluate the practice or process within a particular institution or a specific program?	⊗ Yes ○ No (If the intention upon designing and conducting the project is not to improve or evaluate a specific practice/program, then the answer should be "No" indicating research intent and IRB review is likely required. If the project is intended to create knowledge or draw conclusions applicable beyond the particular institution or specific program, then the project is likely research as defined by the federal regulations and IRB review or exemption is required.)

If no message appears above indicating the certification is not valid, IRB Review is not required because, in accordance with federal regulations, the project does not constitute human subjects research as defined under 45 CFR 46.102(d).

Student: Sign this form below attesting to the accuracy. Download and save a copy of the completed form, print or email the form to your advisor for signature. This serves as record that IRB review is not required for this project.

Student: I certify that the information provided is accurate.

Kathy O'Neill

Student Signature date: 03-27-2020

The following information is to be completed by the student's advisor once the student has completed and submitted the form. Please note - once the form is formally 'Submitted' the student should save a PDF copy of the form and forward the PDF to their advisor for review and signature.

Advisor: I have reviewed the student project and agree to the information provided.

(Please note - this field is for Advisor completion)

Advisor Signature date: 3/27/20